

Active Play and Healthy Development

Prepared for the BRITISH TOY & HOBBY ASSOCIATION by Jeffrey Goldstein, Ph.D.

This is one in a series of papers published by the British Toy and Hobby Association on the value of play. Each paper reviews research findings on one aspect of play. 'Active Play and Healthy Development' presents the findings of more than 75 studies that examine the effects and functions of physically active play, for young and old.

Physical play begins in infancy, with rhythmic repetitive movements -- clapping hands in time to music, pat-a-cake, and dance. It develops into active play during the preschool years and rough-and tumble play during the primary school years. Sport begins afterwards, in middle childhood, and may continue throughout life. This paper looks at research that helps us understand why active play is so important to the health and well-being of children as well as adults.

WHY ACTIVE PLAY IS IMPORTANT



All types of play, from fantasy play to rough-and-tumble, have a crucial role in children's development. Children experience their world, and the world of others, through play. It is the primary activity that promotes the skills that will be needed throughout life. If deprived of play, children will suffer both in the present and in the long-term. With adequate play, children stand the best chance of becoming healthy, happy, productive members of society.

Encouraging active play and participation in sports is vital for our children. Why?

Because there are fewer opportunities for active play than in the past – fewer urban play spaces, less school time devoted to play and sport, fewer playmates at home to play with. This contributes to the sedentary lifestyle of young people and the problems, such as obesity, that may accompany it.

- Active play has immediate benefits, such as cardiovascular fitness, and long-term benefits, including a healthy lifestyle and better physical, intellectual and social skills
- Play develops the brain
- Physically active play improves muscle control and co-ordination, strength and endurance, and may promote fat reduction and body temperature regulation
- Play is an effective teaching strategy both in school and out

Given the space and resources, children enhance their physical development through play that draws upon bodily movement and control. They build muscle strength and can develop habits and interests that form the basis for a healthy lifestyle. Children only become “couch potatoes” when adults restrict their activity, limit their access to outdoor play and allow children to spend excessive time on “screen play” with a television or computer. -- What is play? Children’s Play Information Service. 2002. www.ncb.org.uk

Playful children are popular and happy

Active play is not just about physical growth and development but also builds self-confidence and social skills. In one study, young people aged 12 to 22 years who regularly engaged in vigorous physical play were found to be less shy than others. Those who participated in team sports scored lowest on a measure of shyness (Page & Zarco, 2001). In a study of girls 9 to 13 years old, those who engaged in regular physical activities had higher self-esteem (Schmalz, et al., 2007).

Playful children are happier, better adjusted, more co-operative, and more popular with their peers than those who play less. *‘Children play longer when a wide variety of toys is available. Playful children are more physically active, creative, humorous, imaginative, emotionally expressive, curious and communicative’*. -- Jerome Singer. 1994. Imaginative play and adaptive development.



Motor skills

Play is a form of exercise that increases co-ordination, flexibility, and precision in movement. Infants and toddlers first explore objects to become familiar with them, and as mastery is achieved, they play with objects in lighthearted ways. Physical features of toys, particularly their novelty and responsiveness to the child's movements, influence interest and duration of play.

Exploration

The ability to sustain attention to objects, events, and tasks is important for many kinds of learning and performance. Attention span during play depends almost solely on the type and number of toys available (Moyer & Gilmore, 1955).

Before about age 1 children's attention is determined by the colour, size, shape and taste of objects. Bright colours and gentle sounds hold their attention. The physical features of toys, particularly their novelty and responsiveness to the child's movements, influence interest and duration of play.

Co-ordination

Even in reaching for a toy, a baby develops hand-eye co-ordination, strength, balance and agility – skills necessary for walking and all other movement. Activity centres, block letters, shape sorters, and games help children acquire skills necessary for language and reading. Play involving brisk movement is related to the development of a wide variety of physical skills, including those involved in sports (Bunker, 1991).

Children need to attain the following motor skills:

- Locomotor, or gross motor, development involves large movement patterns, such as walking, running, jumping, hopping, skipping, sliding, climbing, crawling, standing, sitting
- Maintaining equilibrium and balance, such as bending, stretching, twisting, pivoting, swinging, rolling, landing, stopping, dodging, balancing
- Manipulative or fine motor skills and hand-eye and foot-eye coordination skills, such as throwing, catching, kicking, volleying, bouncing, rolling, pulling, pushing, grasping, reaching, holding, cutting, typing, writing, drawing, painting. -- Helen Bilton. *Playing outside*. 2004. p. 32

Physical activity can influence 8 components of physical fitness: agility, balance, amount of body fat, cardio-respiratory endurance, flexibility, muscular endurance, muscular strength, and anaerobic power. -- Baranowski, and others. 1992. *Assessment, prevalence, and cardiovascular benefits of physical activity and fitness in youth*.

Rough-and-tumble play

Rough-and-tumble (R & T) may be the most fundamental form of active play. R&T includes running, chasing, play wrestling, and often lots of noise. It is unique and can be readily distinguished from aggression. In other words, aggressive play is not the same as aggressive behaviour. You can usually tell rough-and-tumble play from genuine fighting. In rough-and-tumble, children will be smiling and laughing, and they will remain together once they're finished playing. Children who are really fighting will separate once the fight is over. (Reed 2005).

'Professionals need to be careful not to equate play-fighting with serious fighting and not to label a child as "aggressive" simply because he or she prefers a particular kind of play. Given many children's interest and enjoyment in active, locomotor (physical)

play, children should be given numerous opportunities for this type of play as well. Such activities likely contribute to motor development, overall physical fitness and possibly cognitive development'. -- Power. 'Play and exploration in children and animals'. p.395.

R & T usually involves playing with others and is related to social skills, status and emotional control (Pellegrini & Smith 1998; Reed 2005). This kind of active play, especially outdoors, burns more calories than other forms of play. R&T is not just a physical release, it also '*may facilitate friendships and promote co-operative prosocial behaviours and attitudes*' (Scott & Panksepp, 2003, p. 549).

Active free play can lead to improved academic performance

One study shows that providing primary school children with play breaks during the school day maximises their attention to cognitive tasks. Without play, self-control does not develop adequately. Research by Anthony Pellegrini and Robyn Holmes shows that providing children with play breaks during the school day maximises their attention to cognitive tasks. '*Play affords juveniles opportunities to learn and practice new skills. The more complex the organism and the corresponding skills to be learned, the longer the juvenile period is extended and the more important play seems to be*' (Pellegrini & Holmes 2006).

In a study of two fourth-grade classes in a suburban school, when students had recess they were less fidgety and stayed on task longer in class. (Jarrett, and others, 2001).

Competent play is related to early school performance, while disruptive play is associated with difficulties at school. By the time children attend preschool, they should already have experience playing at home with peers. Relationships between parental reports of children's peer play at home and indicators of children's school readiness were examined in a study by Fantuzzo. Behaviour ratings and observational data were collected for 242 preschool children from a large urban Head Start programme. Relationships between children's home-based, peer-play behaviours and the children's classroom behaviours (school-based peer play, approaches to learning, self-regulation, and behaviour problems) were analysed. Play competence exhibited in the home environment was significantly associated with helping in the classroom, motivation to learn, task persistence, and autonomy. Disruptive or disconnected play behaviours were significantly related to patterns of disruptive experiences in the classroom with peers and with the learning process (Fantuzzo, 2002).

Creativity increases following free play

Children produced more colourful and complex art after being allowed to play, compared to children who first followed a structured exercise. Fifty-two English school children 6 to 7 years old were randomly assigned to two groups. The first group was allowed to play for 25 minutes, while the other group copied text from the board. All children were then asked to produce a collage of a creature, using a limited range of tissue-paper materials. Ten judges assessed the creative quality of the resulting work. The range of colours and total number of pieces used by each child was recorded. The results revealed a significant positive effect of unstructured play upon creativity. -- Howard-Jones & others. 2002. The effect of play on the creativity of young children during subsequent activity.

Play and emotion

In one study, 44 preschool children (22 boys, 22 girls) were interviewed about their understanding of emotion. In addition, the amount of children's pretend and physical play with a same-sex friend from their preschool classroom was assessed. Findings suggest that emotion regulation and emotion understanding (part of what is meant by 'emotional intelligence') make unique contributions to teacher ratings of children's emotional competence with peers. Different patterns of associations were found for boys and girls. High levels of pretend play were associated with greater emotional understanding for both boys and girls, and with greater emotion regulation and emotional competence for girls. Physical play was associated with boys' emotional competence with peers (Lindsey & Colwell, 2003). Preschoolers' emotional competence: Links to pretend and physical play.

Impulse control (emotional self-regulation)

Fantasy play allows children to work through conflict and painful feelings. In play, children learn how and when to express or control their emotions. Even play fighting requires a good deal of self-control and restraint, serving as practice for exercising restraint in more serious contexts (Power 2000, Galyer & Evans 2001).

Active play and risk-taking

'Risk-taking is a powerful way of learning. When we take a risk, we face success or failure. Success raises our self-esteem. Failure may hurt, but it teaches us to do things differently next time. Children need to learn to make sensible choices as they get older and sometimes this takes a few mistakes...Of course adults need to limit the risks children take to prevent serious injuries. Ideally, though, we shouldn't remove risks completely. We can't prevent every injury, and minor ones can be a useful learning experience, after all.' -- BBC http://www.bbc.co.uk/schools/parents/life/health_happiness/health/play_fighting.shtml accessed 8 Nov 07

If you make an environment hazard free it becomes challenge free, and then *'children have less experience in making decisions on their own, less opportunity to assess their own personal frontiers and less opportunity to gain confidence and self-esteem through coping independently'*. -- Stephenson. 2003. Physical risk-taking: Dangerous or endangered? (see also Gill 2007.)

Even children under 2 take on considerable physical challenges: negotiating steps, transporting materials, climbing into a swing, managing to make a bike move, running. These "risky" activities extend children's physical prowess and independence. *'Too often the concern to remove all hazards from a playground can inadvertently also lead to the removal of all opportunities for risk-taking'*, writes Stephenson (p. 35).

Risk taking as a form of intelligent behaviour

According to one psychologist, 'Intelligent people seem to have an almost uncontrollable urge to go beyond established limits and creative people seem compelled to place themselves in situations where they don't know what is going to happen. They accept confusion, uncertainty, and the higher risks of failure as part of the process and learn to view failure as normal, even interesting and challenging'(Costa, 1991, p. 41).

Stephenson writes, *'the discourses that surround us tend to focus on the "darker" side of risk – seeing the uncertainty, the possibility of failure, of injury. As teachers, however, it is important that we ensure that the positive aspects of risk are also*

acknowledged – the possibility of discovering that one is adventurous, daring, brave, strong, confident and successful’ (p. 42).

(See Table 1.)

Table 1. Some skills developed through physically active play

- Motor skills
 - balance
 - coordination
 - flexibility
 - endurance
 - strength
 - agility
- Cognitive / intellectual development:
 - attention
 - problem solving
 - creativity
 - goal-setting
 - exploration and discovery
 - manipulation
- Emotional development
 - self-regulation of emotion
 - curiosity
 - taking measured risks
- Social development. When playing with others:
 - children must communicate clearly to one another
 - they must cooperate on the basic elements of play, such as sharing and taking turn

PLAY AND HEALTH

Active play is continually limited by diminishing public space for play and sports, and reduced opportunities for outdoor and social play. This contributes to the sedentary lifestyle of young people and the problems, such as obesity, that accompany it. Encouraging active play and participation in sport thus becomes of vital importance.



Play develops the brain

Play theorist Brian Sutton-Smith believes that the human child is born with a huge neuronal over-capacity, which if not used will die. *'Not only are children developing the neurological foundations that will enable problem solving, language and creativity, they are also learning while they are playing. They are learning how to relate to others, how to calibrate their muscles and bodies and how to think in abstract terms. Through their play children learn how to learn. What is acquired through play is not specific information but a general mind set towards solving problems that includes both abstraction and combinatorial flexibility where children string bits of behaviour together to form novel solutions to problems requiring the restructuring of thought or action'*. -- Sutton-Smith. 1997. The Ambiguity of Play.

Play influences neurological development and determines how intricate neural circuits are wired. Among other research, positron-emission tomography scans of Romanian orphans with play deprivation indicate that play is as essential to human development as other basic needs. -- S. Begley, 1997. How to build a baby's brain.

According to a report by the American Academy of Pediatrics, *"Play is essential to development because it contributes to the cognitive, physical, social, and emotional well-being of children and youth. Play also offers an ideal opportunity for parents to engage fully with their children. Despite the benefits derived from play for both children and parents, time for free play has been markedly reduced for some children."* -- K. Ginsberg and others. 2007. The importance of play in promoting healthy child development and maintaining strong parent-child bonds.

Toy play at age 18 months is related to the child's intelligence at age 3 years

Playful children are happier, better adjusted, more co-operative, and more popular with their peers than those who play less. Children play longer when a wide variety of toys are available. In one study, the availability of toys in infancy was related to the child's IQ at 3 years of age. Children with access to a variety of toys are found to reach higher levels of intellectual achievement, regardless of the children's sex, race, or social class. -- Elardo and others. 1975. The relation of infants' home environments to mental test performance from 6 to 36 months. Bradley. 1985. Play materials and intellectual development.

Girls who engage in active play as children are more likely later to be involved in sport (Giuliano, Popp, & Knight, 2000).

Exercise for the brain

Computer programs to improve brain performance are a booming business. These products are often said to be based on scientific research. To be charitable, we might call them inspired by science — not to be confused with actually proven by science. *'One form of training, however, has been shown to maintain and improve brain health — physical exercise. Exercise improves what scientists call "executive function," the set of abilities that allows you to select behaviour that's appropriate to the situation, inhibit inappropriate behaviour and focus on the job at hand in spite of distractions'*, write Aamodt and Wang, a professor of molecular biology. Executive function includes basic processes like response speed and memory. Executive function starts to decline when people reach their 70s. But elderly people who have been athletic all their lives have much better executive function than sedentary people of the same age.

Exercise is also strongly associated with a reduced risk of dementia late in life. People who exercise regularly in middle age are one-third less likely to get

Alzheimer's disease in their 70s as those who did not exercise. Even people who begin exercising in their 60s reduce their risk significantly (Aamodt & Wang 2007).

How might exercise help the brain? Fitness training slows the age-related shrinkage of the frontal cortex, which is important for executive function. In animals, exercise increases the number of capillaries in the brain, which should improve blood flow, and therefore the availability of energy, to neurons. Exercise may also help the brain by improving cardiovascular health, preventing heart attacks and strokes that can cause brain damage. Finally, exercise causes the release of growth factors, proteins that increase the number of connections between neurons, and the birth of neurons in the hippocampus, a brain region important for memory. Any of these effects might improve cognitive performance, though it's not known which ones are most important. -- Aamodt & Wang. 2007. Exercise for the brain.

Functions of physical play include motor control, strength and endurance, and self-regulation of emotions

Pellegrini and Smith consider the nature of physically active play and its possible role in children's development. They distinguish three kinds of physical activity play: rhythmic movements peaking in infancy, exercise play peaking during the preschool years, and rough-and-tumble play which reaches its peak in middle childhood. Gender differences (greater prevalence in males) characterise the latter two forms. Function is considered in terms of beneficial immediate and deferred consequences in physical, cognitive, and social domains. Whereas most theories assume that children's play has deferred benefits, Pellegrini and Smith suggest that forms of physical activity play serve primarily immediate developmental functions. Repetitive rhythmic movements in infancy are hypothesised to improve control of specific motor patterns. Exercise play is hypothesised to function primarily for strength and endurance training; less clear evidence exists for possible benefits for fat reduction and thermoregulation. In addition, there may be cognitive benefits of exercise play that are largely incidental to its playful or physical nature. Rough-and-tumble play has a distinctive social component; it serves primarily dominance functions; evidence for benefits to fighting skills or to emotional coding are more equivocal. -- Anthony Pellegrini & Peter K. Smith. 1998. Physical activity play.

Play has immediate benefits, such as cardiovascular fitness, and long-term benefits, including a sense of morality

An article in the American Psychological Association Monitor on Psychology examines the positive effects and utter necessity of play. The most common theory is that juveniles play at the skills they will need as adults. Some newer thinking proposes it is more than that. Play seems to have some immediate benefits, such as aerobic conditioning and fine-tuning motor skills, as well as long-term benefits that include preparing young animals for the unexpected and giving them a sense of morality. How? *'Through rough and tumble play, animals form social bonds, acquire different dominance ranks and learn what behaviours are acceptable: how hard they can bite, how roughly they can interact, and how to resolve conflicts'. They learn 'right' from 'wrong'.* (Azar 2002).

If obesity is the problem, play may be the solution

Obesity is more than just a cosmetic concern. Short- and long-term physical and psychological problems can result from childhood obesity, which has been linked to shorter life spans and a number of health factors including diabetes, cardiovascular disease, high blood pressure, stress on bones and lungs, high cholesterol, joint disease, irregular menstrual cycles and stroke. Furthermore, obese children are often

teased and psychological effects can include feelings of inadequacy, low self-esteem and embarrassment. When these children become obese adults, they are often discriminated against and have difficulties in finding jobs and establishing relationships.

Childhood obesity results from genetics, the environment, including parental example, emotional instability, hormone levels and also intake-activity relationships. For the majority of people involved with children, the intake-activity relationship is the only factor they can reasonably influence. Increasing the physical activity level among children is complicated. Schools, under pressure to increase test scores, are decreasing children's opportunities to participate in break periods and physical education. -- <http://www.ptotoday.com/play4.html>

Table 2. Calories burned per hour

ACTIVITY	100 lb. person	150 lb. person	200 lb. person
Aerobics: high impact	336	504	672
Aerobics: water	192	288	384
Basketball	384	576	768
Bicycling: stationary, moderate	336	504	672
Bicycling: 15 mph	480	720	960
Bowling	144	216	288
Calisthenics: moderate	216	324	432
Dancing: disco, ballroom	264	396	528
Football: competitive	432	648	864
Gardening	216	324	432
Golf: using cart	168	252	336
Gymnastics	192	288	384
Heavy household cleaning	216	324	432
Hiking: cross country	288	432	576
Hockey: field and ice	384	576	768
Ice skating	336	504	672
Martial arts	480	720	960

From <http://www.move.va.gov> accessed 11 Nov. 2007

Recent studies suggest one solution to childhood obesity is to encourage children to participate in active free play outdoors. Children burning calories in play on a playground are more likely to maintain a healthy weight. Cardiologists recommend that children get 30 minutes of vigorous cardio-respiratory exercise at least three times a week. Outdoor play areas are excellent places to promote active and healthy recreational habits.

Physically active play burns more calories than other forms of play. And physical play outdoors burns more calories than physical play indoors. (Pellegrini, Horvat & Huberty. 1998).

Play spaces should provide challenging activities for children who are not as physically adept as their non-obese peers, so that they will have opportunities to be physically active during play times. -- Bilton. 2004. Playing outside.

Young animals living in an environment with a surplus of food rarely develop obesity – they simply play more

'Animals play so that they burn up energy that might otherwise be stored as fat... By engaging in energy-burning play, animals remain lean and fit, making them less

susceptible to predators. If excess calories were not burnt off in play, then the resulting obesity might increase the risk of predation by impeding escape ability through increasing balance problems, fatigue, muscle strain, inability to enter narrow spaces, and amount of non-propulsive tissue. Moreover, because play activity raises basal body temperature, it could decrease the young animal's susceptibility to cold stress and pathogens.... The amount of play varies with the amount of food available. Young animals living in an environment with a surplus of food rarely develop obesity – they simply play more'. -- Thomas G. Power. 2000. Play and exploration in children and animals. p. 154.

Combating childhood obesity with physical play opportunities

'When considering 'solutions' for the childhood obesity problem, the basic factors involved in obesity must be considered. These include genetics, emotional stability, hormone levels, and intake-activity relationships. For the majority of people involved with children, the intake-activity relationship is the only factor with which it is possible to affect. And of that factor, only the 'activity' aspect is within reach'. -- Pei-San Brown, and others. 2002. Combating childhood obesity with physical play opportunities.

Electronic games and physical activity

Some of the latest video games and interactive toys require vigorous physical movement, dancing or performing many of the same actions as in sport. The health benefits of rhythm action have been well documented. Dance mats and other plug-in interactive games that require vigorous movement have helped promote the genre as a beneficial tool for weight loss. Dance mats such as 'Dance Dance Revolution' have been promoted on college campuses as a tool both for building community and fitness. The health benefits of dance videos have been incorporated into the California school system where some institutions have incorporated DDR into their physical education programme. The possible health benefits are clear: one dance-along song, 'Max 300' is 88 seconds long and, set on 'maniac' speed requires 578 steps. That works out to an average of 6 steps per second.' -- Edge, 2003, no.124.

Active play and ADHD
Panksepp and his colleagues propose a connection between rough and tumble play and ADHD (attention deficit hyperactivity disorder). ADHD is characterised by an inability to concentrate on one task, hyperactivity, and impulsivity. It is the fastest-growing behavioural problem among young people, estimated to affect up to 7% of school-age children. Its rise has coincided with a reduction in outdoor spaces for play and recreation. Panksepp reports that abundant access to active play reduces impulsivity in experimental animals. He believes that a regimen of social rough and tumble play might help children with ADHD impulse control (though this has yet to be tested directly). -- Panksepp. 2003. Modeling ADHD-type arousal with unilateral frontal cortex damage in rats and beneficial effects of play therapy.

New videogame technology may help children with ADHD
Alan Pope of NASA, the space agency, developed a technique whereby EEG biofeedback is used to keep a joystick operating. Signals from sensors attached to the player's head and body are fed through a signal-processing unit to a video game joystick. As the player's brainwaves come closer to an optimal, stress-free pattern, the joystick becomes easier to control. This encourages the player to produce these patterns or signals to succeed at the game. Children with ADHD (attention deficit hyperactivity disorder) have been found to increase attention span through this device. -- Pope. 2001. Attention and video games.

PLAY DEPRIVATION

'A child who is not being stimulated, by being ... played with, and who has few opportunities to explore his or her surroundings, may fail to link up fully those neural connections and pathways which will be needed for later learning.' -- Sutton-Smith. 1997. p. 17

Children who do not play, or who do not play as often as other children, are at increased risk of psychological, intellectual and social deficits. To reap the full benefits of play, children need supportive adults who recognise the value of play and encourage children by providing a safe play environment and sufficient playthings to permit a wide variety of play activities.

Play opportunities are continually reduced in Western society

Children have fewer brothers and sisters with whom to play. Less school time is devoted to active play, and public outdoor play spaces are disappearing whilst those that remain are often regarded as unsafe. Drawing on research from a number of disciplines, McArdle concludes that *'play may well be central to normal personality development. However, its place in contemporary Western society is not secure, perhaps risking the development and well-being of urban and disadvantaged children in particular.'* -- McArdle. 2001. Children's play.

Fear of risk reduces play opportunities

Tim Gill, author of *No Fear: Growing Up in a Risk-Averse Society* London: Calouste Gulbenkian Foundation, argues that the nature of childhood in the UK is being undermined by the growth of risk aversion which restricts children's play, and their exploration of the world around them.

'What happens if animals or humans are deprived of play? Brains mature more slowly. Play increases gene expression in the frontal lobe for a protein thought to be involved with brain maturation. Without play, self-control does not develop adequately.' – Azar. 2002. It's more than fun and games.

ENCOURAGING ACTIVE PLAY



Some children need extra support in order to reap the benefits of play

Children who are shy, obese, or not well-coordinated will need encouragement for physical play. Toys, playground and sports equipment should be chosen so that they

are easily accessible to physically challenged children but still be exciting.
<http://www.ptotoday.com/play2.html>

Children who are not highly motivated by play tend to have difficulties with language. Some children do not have 'play competence', and they lack motivation for play because of this communication barrier. These children need support so that they can experience the benefits of play. – Westman. 2003. [Play and communication.]

One study found that music stimulates movement and physical play among 3 to 6 year old children (Scott & Panksepp. 2003).

Children will play longer and more constructively if given a choice in how to spend their play time (Tegano & Burdette 1991).

Toys, not sweets

One study investigated whether children in the U.S. would choose toys over sweets when offered a choice on Halloween. The 284 boys and girls, age 3 to 14, who were part of this study were just as likely to choose toys as sweets. There were no gender differences. According to this research, children will not be disappointed by toy treats rather than sweets. -- Schwartz, and others. 2003. Trick, treat, or toy: Children are just as likely to choose toys as sweets on Halloween.

Toys are important, but they are no substitute for warm, loving, dependable relationships

An article in the American Academy of Pediatrics journal focused on selecting appropriate toys for children. *'Play is essential for learning in children. Toys are the tools of play. Which play materials are provided and how they are used are equally important. Adults caring for children can be reminded that toys facilitate but do not substitute for the most important aspect of nature – warm, loving, dependable relationships. Toys should be safe, affordable, and developmentally appropriate. Children do not need expensive toys. Toys should be appealing to engage the child over a period of time. Information and resources are provided in this report so pediatricians can give parents advice about selecting toys.'* -- Glassy & Romano. 2003. Selecting appropriate toys for young children: The pediatrician's role.

Promoting dramatic play in outdoor environments

Dramatic play on playgrounds offers important benefits for children. However, creating play spaces that promote dramatic play is a complicated process and one that has generally been ignored on public and school playgrounds. *"Outdoor play environments, particularly public school and city park playgrounds, are frequently barren of needed props for dramatic play -- play houses, water and sand areas, wheeled vehicle areas, dress-up clothes, containers, tools, and so forth".* Considering the environment of the playground is important because where children play directly impacts how children will interact with each other, and their environment will affect the cognitive level and intensity of play. -- Frost. 2001.

Alison Stephenson discusses the need to balance the requirement for safety with the need to provide children with physical challenge. What is challenging for one child may be a hazard for another. *'There is a need, both in the planning of outdoor play spaces, and also in the day-to-day supervision of them, to clearly distinguish between activities that have an acceptable element of risk and others that present real hazard. My observations suggest that playgrounds which offer opportunities to swing, climb, slide, run, ride, and to play in open-ended ways with materials such as sand and water provide a satisfying range of physical challenges for the younger children. However, many centre playgrounds do not provide older children with a*

similar range of challenging physical experiences at their level' (Stephenson Pp. 39-40).

SEX DIFFERENCES IN PLAY STYLE AND TOY PREFERENCES

Children may be biologically predisposed to respond to particular toys

Boys are typically more physically active than girls and this is reflected in their play. Sex differences have been explained in terms of both culture and biology. The cultural view is that sex differences are learned as part of gender socialisation, during which children are influenced by the adults, and later by the other children, around them. Recent biological studies provide further explanation.

Baby primates (vervet monkeys) show sex differences in play styles and toy preferences that mirror those of children

Evidence from patients with endocrine disorders suggests that biological factors during early development (levels of androgens) are influential in children's toy preferences. In this study, vervet monkeys aged 2-18 months show sex differences in toy preferences similar to those documented previously in children. The percent of contact time with toys typically preferred by boys (a car and a ball) was greater in male vervets than in female vervets, whereas the percent of contact time with toys typically preferred by girls (a doll and a pot) was greater in female vervets than in male vervets. In contrast, contact time with toys preferred equally by boys and girls (a picture book and a stuffed dog) was comparable in male and female vervet monkeys. These differences may have evolved based on the different behavioural roles of males and females. – Alexander & Hines. 2002. Sex differences in response to children's toys in nonhuman primates.

Sex differences in sensitivity to colour and movement, coupled with findings that hormones influence play and toy selection, support an evolutionary view of play

Large sex differences in children's toy preferences are typically attributed to gender group identification and social learning. Alexander suggests that contemporary categories of 'masculine' and 'feminine' toys are also influenced by evolved sex differences in perception. Research on children exposed prenatally to atypical levels of androgens suggests that sex preferences exist for certain object features, such as movement, colour and form. The evolution and biology of visual information processing, plus the findings of Alexander & Hines (2002) on male-female differences in toy preferences in nonhuman primates, suggest that an innate sex difference in processing movement, colour or form may be adaptive for males and females. There may be a 'biological preparedness' for objects such as toys that prepare the young for a 'masculine' or 'feminine' gender role, which develops more fully when coupled with contemporary gender socialization. Young females are more attracted by round, softly coloured objects, whilst males prefer moving objects. -- Alexander. 2003. An evolutionary perspective of sex-typed toy preferences: Pink, blue, and the brain. Norderstrom & others. 2002. Sex-typed toy play behaviour.

Although boys and girls play differently they are alike in basic ways. Both need variety in their play – playing alone as well as playing with others of varying ages, playing quietly and playing actively.



Girls who engage in active 'masculine' play as children are more likely later to be involved in sport

Do childhood play activities predict future sport participation by women? Eighty-four American women university students (40 varsity athletes and 44 non-athletes) completed a questionnaire that measured their adult experiences with sports as well as their childhood play activities. The results revealed that playing with 'masculine' toys and games, playing in predominantly male or mixed-gender groups, and being considered a 'tomboy' distinguished between women who later became college athletes and those who did not. These findings suggest that childhood play activities should be considered, along with other agents of socialization (family, peers, coaches), as important factors in predicting future sport participation by females. -- Giuliano. 2000. Footballs versus Barbies: Childhood play activities as predictors of sport participation by women.

PARENT - CHILD PLAY

The infant's first play experiences are with adults, as they smile at, tickle and talk to the baby in an effort to elicit a sustained and pleasurable response. The richest play occurs when adults take part. The most creative children are those who have had adults involved in their play. Whilst playing with adults, children display higher levels of language and problem-solving skills than when playing with their peers. It is not only the children who benefit from adult-child play, parents and grandparents do, too. For adults, play is relaxing, and helps to maintain mental skills, like memory and problem solving. Active games build and help to maintain muscle tone, coordination and reaction time. (Goldstein 1996; Singer 1996).

In play, parents directly affect the development of their young children

'Parents directly affect the behaviour of their young children when they engage the children in play. When playing with parents, infants' and toddlers' behaviour is more complex, more conventional, of longer duration, and more symbolic than when playing with peers, siblings, or alone... When parents play with infants and young children, the complexity of children's behaviour increases substantially, both in the length of the social interactions, and in the developmental level of children's social behaviour'. --Thomas G. Power. 2000. Play and exploration in children and animals. pp. 362, 375.

Parent-child play strengthens the bonds between children and their parent-playmates

Researchers at Germany's University of Regensburg conducted a longitudinal study of 44 fathers' specific contribution to their children's attachment at ages 6, 10, and 16 years (Grossmann 2002). In toddlerhood, fathers' and mothers' play sensitivity was evaluated. The more active fathers' involvement in their children's play, the greater was the child's parental attachment at age 10. The results confirm that fathers' play sensitivity is a good predictor of the child's long-term attachment.

Fathers and mothers each have unique contributions to make to their children's play

The child becomes more securely attached to the parental play partner. Fathers are more likely than mothers to initiate physically active play with their children (Grossmann and others, 2002). About one-third of fathers engage in rough-and-tumble with their children on a daily basis and only 4% to 16% of fathers never do. *'Certain preliminary results support the hypothesis that father-child rough-and-tumble play fosters the development of the competition skills in children without using aggression'* (Paquette, et al 2003).

Parent-child play is associated with children's social competence

In one study, the amount of time spent in parent-child play was followed by improvement in conduct problems among 4-year-olds (Gardner & others. 2003). In another, connections were examined between parent-child play and social competence in children age 43-80 months. Children's emotion knowledge and self-efficacy were assessed. Child interviews and parent-child laboratory observations were conducted. The pattern of associations observed suggest that mutually responsive parent-child interaction during both pretense and physical play is associated with children's social competence. In addition, parent-child joint pretense play is linked to children's social competence (Lindsey & Mize. 2000).

Children aged 6 months to 2 ½ years living in an orphanage showed significant improvements in motor skills, mental abilities, and social behaviour after a 3- month period in which play was systematically introduced into the daily routine. In the study by Taneja (2002) all 30 children in the orphanage were assessed for Motor, Mental and Social Quotients, using Bailey's Scale of Infant Development and the Vineland Social Maturity Scale. A structured 'regime of play' was then built into the routine of the orphanage. A repeat developmental assessment was performed at the end of 3 months to assess the impact. Out of the original group of 30, 19 children were available for post-intervention assessments. Their mean Motor Quotient rose from 63.7 to 81.7, Mental Quotient rose from 65.8 to 89.6 and the mean Social Quotient rose from 61.9 to 91.3. There was also an overall change in the environment of the orphanage. Children became more active, playful, responsive and independent. Contrary to what caretakers assumed, their workload actually decreased. This study shows that short daily sessions of play can significantly improve the development of children in such institutions.

Half of British parents say they do not have enough time to play with their children

In 2000, a survey by the Preschool Learning Alliance of 1,200 British parents found that more than 50 percent of parents feel they do not have enough time to play with their children. The sample consisted mainly of mothers (95%), who reported playing an average of 1 to 2 hours per day with their child(ren) on weekdays, and 2 to 4 hours per day on weekends.

Play is not regarded positively by all parents

Some parents see play as interfering with schoolwork, while also recognising that the main reason to play with their children is to communicate with them and to better understand them. (Oksal 2002).

Intergenerational play is more important now than ever

In the past, three and sometimes four generations lived and played together under one roof. There were plenty of potential playmates around. But today's children tend to have fewer brothers and sisters, more working mothers, more single-parent households, and grandparents may live far away. Parents more and more want their children to play at home, thus limiting their play with others. So playing games together with parents and grandparents is more important now than ever before.



Guidelines for intergenerational play

A 2002 survey by the British Toy and Hobby Association of paediatric occupational therapists showed agreement that parental participation in play had important benefits for the child. Children need time to play alone, but they love to play with parents and benefit enormously from parental attention. Amongst the benefits cited for children of parental play together were:

- bonding with parents
- encouraging empathy through playing with others
- learning to share and to take turns
- extending the range of the child's activities in a gentle way
- promoting learning
- heightening attention
- acquiring new skills

- exploring safely the child's own limitations and strengths
- understanding boundaries
- releasing emotions and working through emotional issues for the child
- facilitating communication and discussion together through shared fun and laughter

What advice did the professionals offer parents?

- set aside a specific time to play together
- play regularly
- provide a safe and friendly environment for play
- get down on the floor with your child
- allow your child to lead the play
- play can be noisy and messy
- allow repetition

Suitable toys for intergenerational play

Toys especially suited to adult-child play are those that appeal to both children and adults, though perhaps for different reasons. One U.K. project introduced preschool children to toys that their grandparents might have played with between 1900 and 1930 (Cranwell 2002). In cooperative play, parents and grandparents can teach children how to play with these toys. Many toys are classics that are always available.

Table 3. Hypothesised functions and effects of parent-child play

- Cognitive stimulation and learning
- Promoting general cognitive development
- Promoting linguistic skills
- Providing information about the physical environment
- Social development
- Establishing social relationships
- Facilitating social perspective-taking skills
- Facilitating self-regulation and control
- Facilitating gender role development

(from Power, 2000, p. 354)

THE IMPORTANCE OF PLAY FOR ADULTS

Adult play may be more important than ever because it helps us adapt to change. And the world is changing at an increasingly rapid pace. Every two years there is a new 'generation' of technology to contend with. Play helps to develop and hone those skills most necessary for successful adaptation to a changing world – language, communication, planning and strategy, abstract thinking, creative problem-solving, handling emotions, cooperation.

Why do people enjoy playing?

A biologist might ask, what is the evolutionary advantage of play? Play has advantages for both the individual and for society. Through play, the individual not only learns new things but also thinks new things and creates new things. Recent research shows that reward-linked neurotransmitters, such as opioids and dopamine, are released during play (McArdle 2001). In addition, play helps individuals manage

stress. On a societal level, play helps people cope with change. Play develops variety in thinking and in skills. 'A culture with a flourishing tradition of play is more likely to possess "what it takes" to survive than one which does not encourage playful activities', according to play researchers Apter and Kerr (1991).

Through play, adults practice creating and responding to novel situations, making them better able to meet challenges and cope with change

Robert Fagen, a wildlife biologist in Alaska, believes that play teaches animals how to get along in groups, how to traverse their terrain, how to master their own bodies, how to anticipate the patterns that will end in successful mating, dominance, and hunting. As animals grow to maturity, they no longer need to learn as much from their play, but their play keeps them behaviourally flexible. In their play adults practice creating and responding to novel situations, making them better able to meet challenges and cope with change.

Adults sometimes believe that there is an age when a person should stop playing, a time to leave childhood behind and get serious about life. But there is nothing intrinsically childish about play. Among other primate species, play begins in infancy and reaches its highest frequency in the juvenile phase. Although the incidence of play is reduced following puberty, in many species it continues well into adulthood (Pellis & Iwaniuk 2000). Among the functions of play is promoting the establishment and maintenance of social bonds. Sharing a board game or a sports field helps to make and keep friends, among adults as well as children.

Many familiar social activities originated in play – not only sports and games, but theatre, rituals and liturgies, music, folklore, and celebrations such as Halloween, New Year's Eve, Carnival, theme parks, and birthday parties. We need both earnestness and playfulness, work and leisure, to fulfill ourselves.

Daily experience tends to oscillate back and forth between serious and playful states of mind

Which type of play activity will be chosen depends on the need and moods of the individual. Some transactions with others are regarded as contests to be won, as in competitive sports and challenges that pit the individual against the elements, such as mountaineering, cross-country skiing, surfing, and competitive games like chess and Scrabble. Hobbies that involve collecting, attempting to get a 'complete set' also stem from a competitive motive, according to researchers Apter and Kerr (1991). In contrast, other play activities involve give and take, nurturing and being nurtured. Art, music, and photography are the epitome of this sympathetic style of play. Both states are necessary, in childhood and adulthood, because they contribute necessary and complementary types of experience.

Play is typically contrasted with work. But play does not diminish the capacity to work. Paradoxically, it nourishes work and energises us (Beck & Wade 2004).

For adults active play mostly means sports

Of course, any routine physical activity engaged in for pleasure -- from gardening to hiking – can have social, emotional and health benefits, including reduced stress, better endurance, and, among the elderly, a reduced risk of dementia (Verghese and others, 2003).

Play promotes social contacts, which better enables us to cope with stress. Historian James Combs writes, 'Social groups give meaning to play – sports are a metaphor for life, recreation makes people better workers and citizens, leisure is a legitimate

reward for work... Do we in fact learn the "lessons" of play that society wants us to? Do we, for instance, learn sportsmanship and fair play from sports, or do we learn from either playing or watching play to cheat and lie and break the rules and switch teams for more money or throw childish fits or do outrageous things with the expectation of getting away with it? There are clearly both social and antisocial messages from play, approved and unapproved lessons, and often, individual interpretations of what play means' (2000, p. 8).

Play helps us achieve a satisfying level of activity and enables us to experience a sense of joy

'When we play, we sense no limitations', says child psychiatrist Lenore Terr. 'In fact, when we are playing, we are usually unaware of ourselves. Self-observation goes out the window. We forget all those past lessons of life, forget our potential foolishness, forget ourselves. We immerse ourselves in the act of play. And we become free' (1999, pp 21, 33).

According to Terr, there is a turning point with adolescence. *'Will they go on to play in their adult lives? The lucky ones do'.* Her ideas are supported by the research of psychiatrist Stuart Brown, who found that many violent criminals did not play as children (Brown, 1994).

A recent review of research on play in adulthood identified the following benefits: relationship enhancement, creative thinking, mood elevation, optimal activity, improved learning, skill development, self-actualisation, youthful spirit and mental acumen. – Goldmintz & Schaefer. 2007. Why play matters to adults.



For elderly people, play carries health benefits different from those for the growing child

Whereas active play helps children grow in strength and co-ordination, in adults it helps to maintain these skills and retard their inevitable deterioration. In several studies, participation in leisure activities by the elderly was associated with reduced risk of dementia (Aamodt & Wang 2007; Verghese et al, 2003), faster reaction times (Goldstein et al 1997), and a heightened sense of belonging (Hoppes et al 2001).

In focus groups, elderly people, aged 60 to 95 years, identified their favourite games. The healthiest elderly had the greatest interest in the greatest variety of games (Hoppes, Hally and Sewell. 2000). For the people in this study, play served many important functions: mental and physical fitness, continuity, competition, structuring time, and a sense of belonging. The enhanced sense of well-being,

coupled with the mental and physical benefits of active play, underline its importance from infancy and throughout life.

REFERENCES

- Aamodt, Sandra, & Wang, Sam. (2007). Exercise on the brain. *New York Times*, 9 Nov
- Alexander, Gerianne M. (2003). An evolutionary perspective of sex-typed toy preferences: Pink, blue, and the brain *Archives of Sexual Behavior*, 32, 7-14
- Alexander, Gerianne M., & Hines, Melissa. (2002). Sex differences in response to children's toys in nonhuman primates (*Cercopithecus aethiops sabaeus*). *Evolution & Human Behavior*, 23, 467-479
- Apter, M. J., & Kerr, J. H. (1991). The nature, function and value of play. In J.H. Kerr & M.J. Apter. (eds.), *Adult play* (pp.163-176). Amsterdam: Swets and Zeitlinger
- Arnold, Sherri. (2002). Child playgrounds. www.unl.edu/casestudy/456/sherri.htm
- Azar, Beth. (2002). It's more than fun and games. *Monitor on Psychology*, March
- Baranowski, T., and others. (1992). Assessment, prevalence, and cardiovascular benefits of physical activity and fitness in youth. *Medicine and Science in Sports and Exercise*, 24 (supplement 1), 237-247
- Beck, John C., & Wade, Mitchell. (2004). *Got game: How the gamer generation is reshaping business forever*. Cambridge MA: Harvard Business School Press
- Begley, Sharon. (1997). How to build a baby's brain," *Newsweek – Special Edition: Your Child*. 22 March
- Bilton, Helen. (2004). *Playing outside*. London: David Fulton
- Bradley, R.H. (1985). Play materials and intellectual development. In C. Brown & A. Gottfried, (eds.), *Play interactions*. Skillman NJ: Johnson & Johnson
- Bratten, Sue, & Ray, Dee. (2000). What the research shows about play therapy. *International Journal of Play Therapy*, 9, 47-88
- Brown, Pei-San; Sutterby, John A.; & Thornton, Candra D. (2002). Combatting childhood besity with physical play opportunities. <http://www.ptotoday.com/play4.html> accessed 23 November 2007
- Brown, Stuart. (1994). Animals at play. *National Geographic*, 186 (no. 6), 2-35
- Bruya, L. D. (1988). Play spaces for children. North Texas State Univ
- Bunker, L. K. (1991). The role of play and motor skill development in building children's self-confidence and self-esteem. *Elementary School Journal*, 91, 467-471
- Chudacoff, Howard. P. (2007). *Children at play*. New York: New York University Press
- Cole-Hamilton, Issy, & Gill, Tim. (2002). *Making the case for play: Building policies and strategies for school-aged children*. London: National Children's Bureau
- Children's Play Council. (2002). More than swings and roundabouts: Planning for outdoor play. London: National Children's Bureau
- Canadian Parks & Recreation Assoc. www.lin.ca/lin/resource/htms/mo29.htm
- Combs, James E. (2000). *Play world: The emergence of the new ludenic age*. Westport CT: Praeger
- Cranwell, Keith. (2002). Toys and games of yesteryear. Paper presented at Toys, Games and Media congress. London. August
- Doster, Joseph A.; Mielke, Rebecca K.; and others. (2006). Play and health among a group of adult business executives. *Social Behavior and Personality*, 34, 1071-1080
- Elias, Cynthia L., & Berk, Laura E. (2002). Self-regulation in young children: Is there a role for sociodramatic play? *Early Childhood Research Quarterly*, 17, 216-238

- Elkind, David. (2007). *The power of play: How spontaneous, imaginative activities lead to happier, healthier children*. Cambridge, MA: Da Capo
- Elardo, R.; Bradley, R.; & Caldwell, B.M. (1975). The relation of infants' home environments to mental test performance from 6 to 36 months: A longitudinal analysis. *Child Development*, 46, 71-76
- Fagen, Robert. (1981). *Animal play behaviour*. Oxford University Press
- Fantuzzo, John. (2002). The relationship between peer play interactions in the family context and dimensions of school readiness for low-income preschool children. *Journal of Educational Psychology*, 94, 79-87
- Frost, J. L.; Wortham, S.; & Reifel, S. (2001). *Play and child development*. Upper Saddle River, NJ: Merrill Prentice Hall
- Gardner, Frances, and others. (2003). The role of mother-child joint play in the early development of children's conduct problems: A longitudinal observational study. *Social Development*, 12, 361-378
- Gill, Tim. (2007). *No Fear: Growing Up in a Risk-Averse Society* London: Calouste Gulbenkian Foundation
- Ginsberg, K., and the Committee on Communications & Committee on Psychosocial Aspects of Child & Family Health. (2007). The importance of play in promoting healthy child development and maintaining strong parent-child bonds. *Pediatrics*, 119, 182-191
- Giuliano, T.; Popp, K.E.; & Knight, J.L. (2000). Footballs versus Barbies: Childhood play activities as predictors of sport participation by women. *Sex Roles*, 42, 159-181
- Glassy, D., & Romano, J. (2003). Selecting appropriate toys for young children: The pediatrician's role. *American Academy of Pediatrics*, 111, 911-913
- Goldmintz, Yael, & Schaefer, Charles E. (2007). Why play matters to adults. *Psychology and Education: An Interdisciplinary Journal*, 44(1) 12-25
- Goldstein, Jeffrey. (1996). Strengthening family ties through play. *International Play Journal*, 4, 229-237
- Goldstein, Jeffrey; Cajko, Lara; and others. (1997). Video games and the elderly. *Social Behavior & Personality*, 25, 345-352
- Grossmann, Karin, and others. (2002). The uniqueness of the child-father attachment relationship: Fathers' sensitive and challenging play as a pivotal variable in a 16-year longitudinal study. *Social Development*, 11, 301-337
- Giuliano, T.; K. E. Popp; & J. L. Knight. (2000). Footballs versus Barbies: Childhood play activities as predictors of sport participation by women. *Sex Roles*, 42, 159-181
- Hart, Roger. (2002). Containing children: Some lessons on planning for play from New York City. *Environment and Urbanization*, 14, 135-148
- Holland, Penny. (2003). *We don't play with toy guns here*. London: Open University
- Hoppes, Steve; Wilcox, Tim; & Graham, Greta. (2001). Meanings of play for older adults. *Physical & Occupational Therapy in Geriatrics*, 18 (no. 3), 57-68
- Hoppes, Steve; Hally, Carole; & Sewell, Lee. (2000). An interest inventory of play for older adults. *Physical & Occupational Therapy in Geriatrics*, 18 (2), 71-83
- Howard-Jones, P.A.; & others. (2002). The effect of play on the creativity of young children during subsequent activity. *Early Child Development & Care*, 172, 323-328
- Jarrett, O.S.; Maxwell, D.M.; & others. (2001). Impact of recess on classroom behavior: Group effects and individual differences. *Journal of Educational Research* (2001)
- La Cecla, Franco. (1999). The city as a space for play. *Royal Society of Architecture Journal*
- Lindsey, Eric W.; & Mize, Jacquelyn. (2000). Parent-child physical and pretend play: Links to children's social competence. *Merrill-Palmer Quarterly*, 46, 565-591
- Lindsey, Eric W.; & Colwell, Malinda J. (2003). Preschoolers' emotional competence: Links to pretend and physical play. *Child Study Journal*, 33, 39-52

- McArdle, Paul. (2001). *Children's play: Child: Care, health and development*, 27, 506-514
- Macintyre, Christine. (2001). *Enhancing learning through play: A developmental perspectives for early years settings*. Abingdon, Oxon: David Fulton
- Mackett, Roger. (2004). Making children's lives more active. Centre for Transport Studies. University College London. www.cts.ucl.ac.uk/research/chcaruse/
- Moyer, K.E.; & Gilmer, B.H.. (1955). Attention spans of children for experimentally designed toys. *Journal of Genetic Psychology*, 38, 6-7
- Nordernstrom, Anna; & others. (2002). Sex-typed toy play behaviour correlates with the degree of prenatal androgen exposure assessed by CYP21 genotype in girls with congenital adrenal hyperplasia. *Journal of Clinical Endocrinology*, 87, 5119-5124
- Oksal, Aynur. (2002). Intergenerational play: A bridge between child and adults cultures. University of Ankara, Turkey
- Page, Randy M., & Zarco, Emilia Patricia. (2001). Shyness, physical activity, and sports team participation among Philippine high school students. *Child Study Journal*. 31(3) 193-204
- Panksepp, J., Burgdorf, J., Turner, C., & Gordon, N. (2003). Modeling ADHD-type arousal with unilateral frontal cortex damage in rats and beneficial effects of play therapy. *Brain & Cognition*, 52, 97-105
- Paquette, D.; Carbonneau, Rene; Dubeau, Diane; Bigras, Marc; & Tremblay, Richard E. (2003). Prevalence of father-child rough-and-tumble play and physical aggression in preschool children. *European Journal of Psychology of Education*, 18, 171-189
- Pellegrini, Anthony D. (2003). Perceptions and Functions of Play and Real Fighting in Early Adolescence. *Child Development*, 74(5) 1522-1533
- Pellegrini, Anthony D., & Holmes, Robyn M. (2006). The role of recess in primary school. In D.G. Singer, R. M. Golinkoff, & K. Hirsh-Pasek (eds.), *Play = learning: How play motivates and enhances children's cognitive and social-emotional growth*. New York: Oxford University Press
- Pellegrini, Anthony D.; Horvat, M.; & Huberty, P. (1998). The costs of physical play in children. *Animal Behaviour*, 55, 1053-1061
- Pellegrini, Anthony D., & Smith, Peter K. (1998). Physical activity play: Consensus and debate. *Child Development*, 69, 609-610
- Pellegrini, Anthony D., & Smith, Peter K. (1998). Physical activity play: The nature and function of a neglected aspect of playing. *Child Development*, 69, 577-598
- Pellis, S. M., & Iwaniuk, A. N. (2000). Adult-adult play in primates: Comparative analyses of its origin, distribution and evolution. *Ethology*, 106, 1083-1104
- Pope, Alan. (2001). Attention and video games. Paper presented at University of Chicago Cultural Policy Center. <http://culturalpolicy.uchicago.edu/conf2001/index.html>
- Power, Thomas G. (2000). *Play and exploration in children and animals*. London: Lawrence Erlbaum Associates
- Reed, Thomas L. (2005). A qualitative approach to boys rough and tumble play: There is more than meets the eye. In F. F. McMahon, D. E. Lytle & B. Sutton-Smith (eds.), *Play an interdisciplinary synthesis*. *Play & Culture Studies*, vol. 6. Lanham, MD: University Press of America
- Schmalz, Dorothy L., and others. (2007). A longitudinal assessment of the links between physical activity and self-esteem in early adolescent non-Hispanic females. *Journal of Adolescent Health*, 41, 559-565
- Schwartz, Marlene B.; Chen, Eunice Y.; & Brownell, Kelly D. (2003). Trick, treat, or toy: Children are just as likely to choose toys as candy on Halloween. *Journal of Nutrition Education & Behavior*, 35 (4)
- Scott, Eric, & Panksepp, Jaak. (2003). Rough-and-tumble play in human children. *Aggressive Behavior*, 29, 539-551
- Singer, Dorothy G. (1996). Play activities that build bridges across generations. *International Play Journal*, 4, 223-228
- Singer, Jerome. (1994). Imaginative play and adaptive development. In J. Goldstein (ed.), *Toys, play and child development*. Cambridge University Press

Stagnitti, Karen, & Unsworth, Carolyn. (2000). The importance of pretend play in child development: An occupational therapy perspective. *British Journal of Occupational Therapy*, 63, 121-127

Stephenson, Alison. (2003). Physical risk-taking: Dangerous or endangered? *Early Years*, 23, pages 35-43

Sutton-Smith, Brian. (1997). *The Ambiguity of Play*. Cambridge, Mass.: Harvard University Press

Taneja, V.; Sriram, S.; Beri, R.; & Sreenivas, V. (2002). 'Not by bread alone': Impact of a structured 90-minute play session on development of children in an orphanage. *Child: Care, Health and Development*, 28, 95-100

Tegano, D., & Burdette, M.P. (1991). Length of activity periods and play behaviors of preschool children. *Journal of Research in Childhood Education*

Terr, Lenore, M.D. (1999). *Why adults need to play*. New York: Scribner. p. 20

Verghese, Joe, and others. (2003). Leisure activities and the risk of dementia in the elderly. *New England Journal of Medicine*, 348, 2508-2516

Watkinson, E. J., and others. (2001). Engagement in playground activities as a criterion for diagnosing developmental coordination disorder. *Adapted Physical Activity Quarterly*, 18, 18-34

Wellhousen, Karyn. (2002). *Outdoor play every day: Innovative play concepts for early childhood*. Albany, NY: Delmar

Westman, Gunhilde. (2003). Lek och kommunikation. [Play and communication.] *Förskoletidningen*, No.1, 11-17. [in Lego Learning Institute Newsletter, Sept./Oct.] http://www.legolearning.net/download/Playful_Learning_SeptOct03.pdf accessed 26 Nov 2007

Age-appropriate design guidelines for playgrounds www.uni.edu/playground/tips/SAFE/ageappr_guidelines.html

[Back to top](#)